REPORT

OF THE

CANAL COMMISSIONERS

OF

PENNSYLVANIA.

READ IN SENATE,

FEBRUARY 7, 1826.

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CANAL REPORT.

CANAL COMMISSIONER'S OFFICE,

Philadelphia, February 3, 1826.

SIR—I have the honor herewith to transmit to your excellency a report of the commissioners, together with the field notes, drafts and maps therein referred to.

With the highest respect,
Sir, your most obedient servant,

JOHN SERGEANT, President.

To his excellency J. Andrew Shulze,
Governor of Pennsylvonia.

The canal commissioners of Pennsylvania, in obedience to the eighth section of the act of seventh April last, requiring them to present "a plain and comprehensive report of all their proceedings," respectfully submit the following statement.

The attention of the board during the present season, has been directed exclusively to those routes which were supposed to admit of a navigable communication between the Allegheny and Susquehanna river, across the great ridge, which divides the eastern and western waters of the state. Four such routes have been accurately levelled and surveyed, and it remains only for the board to detail the results.

The examination of the most northern route, was intrusted to William Wilson, Esq. of Lycoming county, who left Williamsport with his party on the fourth of July. According to the instructions of the board, he proceeded immediately to the dividing ridge in order to search for a pass, by which a canal might be conducted with a sufficient supply of water upon its summit level.—Such a pass was supposed to exist at Flag swamp, a marsh situated between the north end of Boone's mountain and the ridge which separates Kersey's run (a tributary of Bennett's branch of the Sinnemahoning) from Little Toby's creek. This marsh occupies the centre ground so exactly as to discharge part of its waters into each of these streams, and had therefore been represented to the board as an eligible route for a canal. Accordingly, Mr. Wilson gave his earliest attention to this spot. But after levelling from it to the neighboring streams, in various directions, he found it did not admit of an adequate supply of water. Compelled to abandon this route, Mr. Wilson extended his levels to the head

waters of the Driftwood branch of the Sinnemahoning, and after many fruitless researches, was at length so fortunate as to find a pass 140 feet lower than Flag swamp, and much nearer to the feeding streams which alone can supply any summit in that quarter. Subsequent examinations render it extremely probable, that this pass is in fact the lowest in that part of the country. It is about 400 feet lower than the dividing ridge to the southeast, which separates the branches of Big and Little Toby, and to the north the ridges rise far above it, uniting themselves with the high table land in which Big Toby, the Allegheny, Genessee, Cowanesque, Pine creek and Sinnemahoning have their sources. Its height above the mouth of Juniata is 1409 feet, and above Pittsburg 967 feet.

After discovering this pass, Mr. Wilson proceeded with his levels to Big Toby, in order to determine at what point the waters of that stream could be used for the supply of his summit level; and the result induced him to propose sinking his summit, by means of a tunnel and deep cut, 142 feet below the top of the ridge. At this level it was ascertained that a large quantity of water could be procured from the branches of Toby, and other streams in the vicinity. These streams were carefully measured, and the number of cubic feet, which they are estimated to furnish per day, is as follows:

Upper fork of Toby,	614,400
North-east fork of Toby,	471,460
Elk Lick run,	164,861
East branch of Elk creek,	204,972
Kersey's Mill creek and Carr's run,	75,427
North fork of Elk creek,	125,649
West creek,	113,842
Total,	1,770,611

It is believed that reliance may be placed upon the method pursued in these measurements, but Mr. Wilson has justly remarked, that in the midst of a wilderness, and with no other tools than axes, it was impossible to construct the dams employed, in such a manner as to be tight, and that the flow of water, on this account, is probably much undervalued. Two streams, Mill creek and Otter run, were not guaged, and are therefore omitted in the foregoing list, although Mr. Wilson thinks they would afford a considerable supply.

It has been stated, that in order to obtain this supply of water, the summit level must be depressed, and a tunnel constructed. Mr. Wilson ascertained that the length of the tunnel would be 482 perches, supposing the open canal continued, at each end, until it reached the depth of 40 feet. The soil was found to be a soft clay slate and sand stone, very favorable for such a work, as it is easy of excavation, and would prevent the necessity of arching.

Having finished these operations upon the summit, the routes to the Susquehanna, by the Sinnemahoning and West Branch, and to

the Allegheny by Toby's creek and Clarion river, were next to be attended to. The season was so far advanced, that the first of these only could be examined. But this was carefully done down to the mouth of the Juniata.

The accompanying map and profiles, will give the result of this survey. The draft of Toby's creek and Clarion river, and of the Allegheny to the mouth of the Kiskeminetas, was copied from the state map; and the board cannot therefore be responsible for its correctness. The entire descent to Pittsburg was ascertained from a connexion of the levels taken by the different parties under the direction of the board.

An impression having very generally prevailed, that a practicable pass for a canal might be found at the head waters of the west branch of the Susquehanna, John Mitchell, Esq. of Centre county, was engaged to examine in that direction. He left Bellefonte, with his party, on the 2d of August, and after passing some days in exploring the country which divides the waters of the Big Mahoning and the Susquehanna, established his first level bench at a part of the ridge called in the map "the Clover Patch." From this point he directed his levels to the river, which he struck about a mile and a half below the mouth of Chest creek, and at a depression of 794 feet below the summit of the ridge. He then took his course up the river, to the "Cherry Tree," which stands immediately below the mouth of Cushing creek, about twenty-two miles above the mouth of Chest creek. Here he determined to carry a level up the Cushing, believing that it presented a favorable prospect of a low summit, between the head waters of the river and those of Two Lick creek, a western stream running into Conemaugh. He was not disappointed. A pass was discovered at the distance of four miles from the Cherry Tree, and at an elevation of 257 feet above it, which has proved to be the lowest yet found between our eastern and western waters; being 126 feet lower than that found by Mr. Wilson.

An inspection of the profile of this route will shew that the ascent is very gradual up to the dividing ridge, which is itself a hill of moderate acclivity.

Mr. Mitchell's next business was to determine what waters could be brought to his summit, and for this purpose he made extensive examinations in various directions, which it is not necessary to detail in this report. The result was not fortunate. The whole supply from the eastern waters (two branches of the Susquehanna and Chest creek) amounted to but 69,483 feet per day. The waters on the western side would have to be brought, by a long and circuitous route, over a feeder summit; which, after being excavated to the depth of forty-eight feet, is still 393 feet above the proposed summit of the canal. Of these streams the Black Lick alone was measured, and that at the forks below the feeder summit, and found to yield 46,196 cubic feet per day, Cushing creek and Dutch run were not guaged, but the first is supposed, by Mr. Mitchell, to be equal to Chest creek, and

the second to the south-west branch of the Susquehanna, that is, they would yield 67,114 feet per day. The whole supply of water then, cannot be estimated at more than 182,773 cubic feet, a quantity probably insufficient to provide for leakage and evaporation.

After completing his examination of the summit, Mr. Mitchell returned to the point at which he first struck the river, and continued his levels to the mouth of Clearfield creek, where they were connected with those of Mr. Rawle, and thence to the mouth of Sinnemahoning, where they were connected with those of Mr. Wilson. The board were surprised to find that the distance from the mouth of the Juniata to Pittsburg, was greater by this, than by the northern route. Its computed length is 365 miles and 289 perches. The height of the summit is 1,273 feet above the Juniata at its mouth, and 840 above the Allegheny at Pittsburg.

That part of the draft, which exhibits the route from the summit, by the Two Lick and Black Lick to the Conemaugh, not having been surveyed, was taken from the state map.

At a meeting of the board, which was held at the town of Clearfield, on the 31st of August, it was determined to explore a line from the Susquehanna, by the Clearfield creek, to the head waters of the Conemaugh; and Francis W. Rawle, Esq. was selected for the performance of this duty. After an inevitable delay, caused principally by the difficulty of procuring proper instruments, Mr. Rawle commenced his operations at the mouth of the Clearfield, on the 26th of September. From this point the levels were carried up the stream to the summit of the dividing ridge, between the Clearfield and a small branch of the north branch of the Conemaugh, at the distance of seventy-one miles and seventy-two perches, and at an elevation of 946 feet. It was now necessary to determine the relative heights of this summit and of the feeder line of the survey of 1824, which takes in the streams on the west side of the Allegheny Mountain, upon which the principal dependance must be placed for a supply of water. A line was accordingly run to the level of that feeder, which was found to be 150.61 feet lower than the assumed summit.

It was evident therefore, that the summit of the canal must be depressed; and it was ascertained that this could be done to the depth of 220.34 feet below the top of the ridge by a tunnel 367 perches in length. A feeder line was accordingly established at this level, and was continued until it intersected the north branch of the Conemaugh, 424 perches below Lilly's mill, and 300 perches above the mouth of Ben's creek; the distance from the summit level being 6 miles and 193 perches.

It was not considered necessary to continue this line further, as the ground had been surveyed by the late commissioners and was then under examination by Mr. Davies. It is now ascertained, that the length of the feeder on this side, would be about 18 miles.

Passing over to the Clearfield side, another feeder was run 3

miles and 158 perches in length to Storm's mill stream, the mountain branch of the Clearfield. This and the Munster branch were guaged and found to yield together, 88,878 cubic feet per day.—The streams from the mountain were not guaged by Mr. Rawle, but the water which they would furnish, may be determined from the measurement of Mr. Davies, and of the late commissioners.

The pass adopted by Mr. Rawle, was selected for its vicinity to the feeding streams. To ascertain whether it was in fact, the most eligible, a line of levels was run along the dividing ridge, chiefly on its summit, and at a distance of 2 miles from the first pass, another 84.36 feet lower, was found between the leading branch of the Clearfield and the Elklick branch of the Conemaugh. A deep cut of 66.25 feet at the top, diminishing both ways, and 152 perches in length, would form a connexion on a level with the feeder line of Messrs. Holgate and Clark.

From this place the levels were carried between the other head branches of Clearfield and Conemaugh, of Chest creek and Conemaugh, and of Chest creek and Black Lick, and the dividing ground was found to be generally of the same elevation as the pass first selected.

Mr. Rawle's levels are connected with those of the late commissioners at their tunnel line, and with those of Mr. Mitchell, at the mouth of Clearfield, and also at a branch of Chest creek.

The entire length of this route from the mouth of Juniata to Pittsburg, is about 395 miles. Its lockage would be very considerable, the summit being 1,457 above the former, and 1,024 feet above the latter point.

The attention paid by the late commissioners to the Juniata route, may be supposed to have obviated the necessity of further examination. But as a more eligible pass was supposed by many to exist, and no surveys and levels had been carried down the Conemaugh and Kiskiminetas, the board early determined to employ a party in this quarter; and John Davies, Esq. of Dauphin, was placed at its head.

Mr. Davies began his operations on the first of August, by ascertaining the summit on the Allegheny Mountain, between Bob's creek, a tributary of the Raystown branch, and Bens creek a mountain branch of the Conemaugh. Extensive examinations were next made, in order to determine whether, supposing this summit to be depressed by a deep cut or tunnel, water could be obtained for the purpose of navigation; and levels were run to those streams on both sides of the mountain, which were believed to be available.

The measurement of streams on the east side, gave the following results:

South Poplar run above Black's saw mill,	1	cubic ft.	per sec.
Spring branch of Frankstown branch above Seth's mill,	7	"	"
Blair's creek,	2.2	"	"
Beaver Dam branch of Juniata,	2.7	"	"
Cove creek below M'Kee's mills,	24	"	"

Unfortunately, however, this ample supply of water lies too low to be introduced upon any level, by which the summit might be past.

The first stream was measured 1,275 feet below the summit; and the last, which yields nearly twice as much as all the rest, is 1,531 feet below the same point. The quantity they could supply for a practicable tunnel is very inconsiderable.

On the west side, measurements of the south fork of Conemaugh were made by two methods. The result by the first, which is the same used by the late commissioners, was 359,424 cubic feet per day, and by the second, 359,685 feet. The same stream, in 1824, appeared to yield 2,073,600 cubic feet per day, or nearly six times the quantity found by Mr. Davies. This difference is remarkable, and must have an important bearing on the question of a tunnel. Assuming the measurement of Mr. Davies as correct, and supposing the supply from Bens creek, Bear Rock run, Laurel Smamp Branch, Beaver Dam run, Trout run, and Laurel run, to be ten feet per second, as found by the late commissioners, we may estimate the entire supply of water from the western side upon their tunnel level, at 1,223,500 cubic feet per day.

Having finished his examination of the mountain, Mr. Davies proceeded with a line of levels, down the Conemaugh, Kiskiminetas and Allegheny to Pittsburg, and has furnished the board with a detailed account of all his operations.

The whole length of this route, from the mouth of the Juniata to Pittsburg, is 267 miles and 173 perches. The height of Bob's creek summit above the first of these points, is 2,135 feet, and above Pittsburg 1,702 feet.

In the map and profile, which accompany this report, the Juniata portion has been projected from the notes of the late commissioners.

General Lacock, a member of the board, accompanied Mr. Davies, during the greater part of his operations, and his presence is believed, to have been highly advantageous.

The board have thus submitted, with the utmost practicable brevity a sketch of the surveys performed under their direction. For further detail, they must refer to the reports, and drafts, of the gentlemen employed, which together with their field notes are now forwarded, and to the general map and profile, compiled from those documents by William Strickland, Esq. a distinguished professional engineer.

It is proper to mention, that no efforts have been spared, to ensure accuracy in the work. The best instruments were procured, and the board have reason to believe, were skilfully employed. A connexion of levels, with those of the late commissioners, at the mouth of Juniata, and at Lilly's mill, west of the Allegheny mountain, exhibits a difference of fifteen feet, in the intervening distance. The same levels were tested by the known elevation of Pittsburg above tide water, and found to correspond within about three feet.

The board take pleasure in expressing their entire satisfaction, with all the gentlemen, by whom these examinations were made. The arduous duty enjoined by their instructions, was performed with such fidelity, intelligence, and perseverence, as entitle them to the thanks and confidence of the public.

Upon the facts above referred to, a comparison of routes, remains to be attempted.

It appears to be evident, that the West Branch, and Clearfield routes, cannot enter into competition, with the other two. The former is longer to Pittsburg, and would be longer to Lake Erie, than the northern route. It cannot be supplied with water, at the summit, and as a portage line, it bears no comparison with the Juniata, which is an hundred miles shorter. The Clearfield route would be longer, and more expensive than either of the others. It has less water, and considerably more elevation than the northern route.

The board proceed therefore, to an examination of the northern and Juniata routes.

It has been stated already, that the streams relied on to feed the summit of the former, yielded an aggregate of 1,770,611 cubic feet per day, in the very dry season, at which they were measured. The length of the feeders, and of that portion of the canal, which they must exclusively supply, not having been ascertained, it is impossible to make an accurate estimate of the leakage, and evaporation, but it will be safe to suppose that the loss from these causes, cannot exceed half a million of cubit feet, in addition to the quantity lost at the imperfect dams which were used in guaging, and to the water furnished by the streams not measured. With this allowance, there remains 1,270,711 cubic feet per day, for the purposes of navigation.—Supposing lock chambers of the size used for the Union canal, (which is believed to be the best;) namely seventy five feet long, eight and an half wide, and of eight feet lift, this supply will be equal to 249 lock fulls and at the well known rate of three lock fulls for two boats, will be abundantly sufficient for an uninterrupted water communication. The entire length of this route, from the mouth of Juniata, to Pittsburg is about 353 miles. The elevation of the proposed tunnel, above the former point, is 125 feet, and above the latter 825, making in all 2083 feet of lockage, requiring 260 locks of eight feet lift. The rate at which a boat carrying twenty tons, may be drawn by a single horse, on a well constructed canal, is from two and an half to three miles an hour; and supposing no lockage to intervene, the average distance, which a boat would pass over per day, may be fixed at thirty miles. At this rate, the time of transportation on the northern route, between the points above mentioned, would be about twelve days, independent of lockage, which at ten minutes for each lock, is forty three hours or four days, making the whole passage sixteen days. It is not

possible, from the imperfect data in the possession of the board, accurately to estimate the cost of this route; still, as some such calculation must enter into a decision upon its comparative merits, the opinion of Mr. Strickland, founded upon the best information within his reach, has been obtained. His estimate amounts in the whole to $4,324,100. The particulars composing this sum, together with the estimates of the other three routes, formed on the same principles, are annexed to this report. They must be regarded, only as approminations to the truth, which may answer the purpose of a general comparison.

The ground through which the northern route must pass, so far as it has been examined, presents no serious impediments to the construction of a canal. It may generally be located upon bottom land, adjoining the streams; and stone, timber, and other materials of excellent quality, may every where be had. In turning to the Juniata route, the best method of passing the Allegheny Mountain presents itself as the first and most important question. A majority of the late commissioners were of opinion that a tunnel, sunk 754 feet below the summit which they selected, would be at once practicable and effectual. It must be observed, however, that the streams relied on to feed this tunnel, yielded, when measured by Mr. Davies, only about one half the water which the late commissioners expected to derive from them. The drought of last year was indeed excessive, but the same cause may occur again, and a work of such magnitude, difficulty and expense as the proposed tunnel, should not be undertaken, without a full assurance that when completed it would answer the purpose intended. The board are therefore compelled to say, that there is no certainty of supplying a tunnel with water, unless it be depressed much lower than was contemplated by the late commissioners. The consequent increase of length, is an insuperable objection.

The number of locks which must be crouded together, at both ends, of the tunnel is, in the opinion of the board, another serious difficulty. From the Juniata, at the junction of the south west and Beaver Dam branches, to the forks of the south branch of Conemaugh, a direct distance of seventeen miles, there would be required, supposing the tunnel completed, no less than 166 locks of eight feet lift, to pass which, at ten minutes for each lock, would occupy 27 2-3 hours, or three days.

These circumstances, viewed in connection with the expense of the undertaking, have satisfied the board, that unless a more favorable situation than Blair's or Bob's Creek Gap can be found, the idea of a tunnel must be wholly abandoned. This opinion, however, is given with great deference to the former commissioners, whose talents, industry and zeal, are entitled to the highest respect.

The hope of accomplishing an unbroken water communication, by the Juniata route, being thus laid aside, the board have taken into consideration the propriety, and probable effects, of a portage

over the mountain. For this purpose, the pass surveyed by Mr. Davies must certainly be preferred, as it is lower, and ascends more gradually than Blair's Gap.

It has been suggested, that a basin be established, at the junction of the south west and Beaver Dam branches of Juniata, capable of holding 100 boats, and provided with the necessary cranes, storehouses, &c. That a rail road of the best construction, be carried along the south west branch to Black's Mill, a distance of 12 miles, with a rise of 277 feet, or at an angle of ¼ of a degree. From this point to the summit of the mountain, is about five miles, with a rise of 1276 feet. To overcome this, five inclined planes, separated by short levels, are contemplated. Each inclined plane will have a rise of 255 feet in a mile, forming an angle of 2¾ degrees. Upon each level, a brake may be constructed for regulating the motion of the ascending and descending loads. Wherever the brake is used, the railway must be double. In other places it may be single, with sidelings to permit vehicles to pass each other. On the top of the mountain, it is believed, a level may be formed for the distance of a mile. From the summit westward, the descent is gradual to the forks of the south branch of the Conemaugh, being 1000 feet in eleven miles, or less than one degree. At the point last mentioned, a basin is proposed, similar to that east of the mountain.

The entire length of the route, from the mouth of Juniata to Pittsburg, will then be about 267 miles and 173 perches. The distance from the former point, to the proposed eastern basin, is 126 miles with a rise of 582 feet.

The distance from the proposed eastern basin, to Pittsburg, is 113 miles, and the descent 699½ feet. The whole lockage therefore, will be 1,281½ feet, requiring 160 locks of eight feet lift.—The length of the portage is twenty eight miles.

The time of passing the canal, at thirty miles per day, would be eight days. To pass the locks would occupy twenty-six and two third hours, or nearly three days, and the unloading, reloading and crossing the mountain, may be fixed at two days more, making thirteen days, for the whole passage.

An estimate of the expense of this route, in the mode proposed, framed upon such information as could be obtained, has been made by Mr. Strickland, and is annexed hereto. It amounts to 3,045,900 dollars.

The act of assembly, from which the board derives its power, refers exclusively to the establishment of a navigable communication, between the eastern and western waters of the state. It is evident therefore, that within the strict limit of their duty, they must recommend the northern route, because that alone affords the means of continued water communication. But it perhaps may be a question, whether the advantages possessed by the Juniata route, with reference to cost and distance, do not counterbalance the inconvenience of a portage. The commissioners have already stated the facts which have come to their knowledge, calculated to

thorw light on this important point, but much remains to be done before a final decision can safely be formed. Accurate estimates, founded upon examinations by scientific engineers, should first be made, and every circumstance entitled to weight, be distinctly ascertained. All this may be done in the ensuing season, and it is suggested, that without delaying such legislative measures as may be necessary for commencing and prosecuting the work, the final decision between the routes, be referred to a board of disinterested professional engineers, constituted in such manner as the legislature may think proper, and acting in conjunction with the commissioners.

The board do not hesitate to say, that the practicability of a communication, by one or other of the routes proposed, which shall answer all valuable and useful purposes, is satisfactorily ascertained, and that the commonwealth may safely determine, not only on its commencement, but on its completion. They therefore recommend, that such steps be taken, towards the accomplishment of the whole work, as will ensure its active prosecution, as soon as the most eligible route shall have been fixed with certainty.

Before leaving that portion of the report, which has reference to the surveys, it may be proper to mention, that the citizens of Bedford county, have caused a canal route to be surveyed, which follows the Raystown branch of Juniata, and crosses the mountain, between the head waters of that stream, and of Shade creek, a tributary of Conemaugh. From the report of this survey, it would appear to present many advantages, for the location of a canal. The pass at the mountain, is represented to be lower, than that of Bobs creek, and it is asserted, that abundance of water might be introduced into a tunnel, of not more than 435 perches.

Although this route has not been accurately surveyed, under the direction of the board, it did not entirely escape their attention. That part which lies between Shade creek, and the town of Bedford, was examined at their request by General Lacock, in September last. His report agrees generally with the results of the Bedford survey, except as to the water discharged by Shade creek, which he estimates at from four to four and a half cubic feet per second, while the measurement in December last, is stated at eighteen feet per second.

It may be doubted, whether, at the height practicable for a tunnel, the supply of water would be greater, than in the vicinity of Blair's Gap. General Lacock believed it would not, and in conformity with his opinion, the idea of a more accurate survey was abandoned. But if the supply be sufficient, this is probably the best point, at which a canal could pass the Allegheny mountain. The distance would be but nine miles greater, than by the Frankstown branch.

Upon the whole, it appears to the board, that this route may

deserve a more particular investigation, before the line of the state canal be finally determined on.

In obedience to the injunction contained in the seventh section of the act of 7th April last, the commissioners have made the inquiries therein directed, and submit the following result.

1. That the establishment and management of a fund, for the execution of the work proposed, must be commensurate with the probable cost, and must be so arranged, as to provide for the necessary expenditure, from time to time, as it may be required, in the most economical and least burthensome manner. For this purpose, considerable authority must be delegated of a highly confidential character, and it is believed that such authority, may best be executed by a commission, composed of the officers of the government. It is therefore respectfully suggested, that such a commission be established, and that the persons composing it be denominated "The commissioners of the fund for the improvement of the state." That a fund be established, appropriated exclusively to such works as may be undertaken by the state, and pledged for the payment of the principal and interest of such loans as may be made. That this fund be composed of such revenue as may be provided for the purpose, and of the tolls which may be received from the work—that the accounts of this fund be kept separate from the other funds and accounts of the state, and the whole be under the control and management of the said commissioners—that the said commissioners be authorised from time to time, to borrow such sums as may be necessary for prosecuting the work, not exceeding in any one year dollars, nor in the whole dollars, at a rate of interest not exceeding per cent, payable quarter yearly, the principal reimbursable at such time as may be agreed upon by the lenders, not being longer than twenty years; and to issue transferable certificates of such loans—and that the said commissioners be authorised and required, from time to time, to pay over such moneys as may be necessary, to those who are entrusted with the execution of the improvement.

2d. "The terms upon which loans can be obtained," will of course be liable to some fluctuation. It is not believed, that any very serious change is likely to take place, and the credit of the state is so high, as to warrant the opinion, that loans may be had on the most favorable terms.

The commissioners are well assured, that at the present time, the state making an adequate provision in the first place for the payment of interest, could dispose of a five per cent. stock of one million of dollars, redeemable in not less than 20 years at a premium of five per cent. That a deferred stock, redeemable in not less than 25 years, the interest to commence at the expiration of five years, at the rate of six per cent. (with respect

to which also, they made inquiry) could not be sold at par, or on any terms likely to be satisfactory—And that a stock, bearing a less interest than five per cent. could not be sold at par.

3d. "To provide for the payment of interest on loans, and the final liquidation of the principal" two sources may be relied upon; a revenue, to be raised in such manner as the wisdom of the legislature may devise, and the income to be received from the work—All experience warrants the belief, that the latter may be calculated upon, after the improvement shall be completed, not only to pay the interest, but also to furnish the means of gradually extinguishing the principal of the debt—And even during the progress of the undertaking, as parts are finished, some income may be expected from them, applicable to the payment of interest, but to what extent cannot now be estimated.

It might not seem necessary therefore, to do more, than provide from time to time such revenue, as the state of the debt, and of the income may render indispensible—But in the opinion of the board, a better plan of prodeeding would be, at once to raise a revenue, equal to the interest of the estimated *maximum* of the debt to be contracted, which it is believed, could be done without inconvenience. The surplus in each year, beyond what is necessary for the payment of interest, may be applied by the commissioners to the execution of the work. Such application will to an equal amount, lessen the debt to be contracted, and will so far be the most simple, economical, and efficient sinking fund, as it will be free from all the charges and disadvantages of the operation, usually called by that name. It will have the effect also of enabling the state, at all times to borrow upon the best terms, an advantage which can in no way, be so perfectly secured, as by a previous ample, and easily understood provision for the payment of interest. The revenue thus raised, after the completion of the improvement, will be sufficient, together with the tolls, to ensure the rapid extinguishment of the debt, or to enable the state to accomplish other great public objects.

All which is respectfully submitted.

By order of the Board,

JOHN SERGEANT, President.

Attest.

JOSEPH M'ILVAINE, Secretary.

Estimate No. 1.

Juniata Route, 267 miles 173 perches, from the mouth of Juniata.

	RISE.	LOCKS.	CULVERTS.	AQUEDUCTS.	
From the Susquehanna river to Frankstown branch,	582	73	36	6	
					Dollars.
Basin capable of containing 100 boats, at the junction of Frankstown and Beaver Dam branch,					15,000
Storehouses, cranes, &c,					12,000
28 Miles of rail road, with sidelings and brakes on the east and west side of the mountain, communicating with the south fork of the Conemaugh,					330,000
Basin at junction of south fork,					15,000
Storehouses, cranes, &c.					12,000
From south fork of Conemaugh to mouth of the Kiskiminetas,	653	81	32	2	
From Kiskiminetas to Pittsburg,	46.46	6	10	2	
	1281.46			10	40,000
			78		117,000
		160			800,000
268 Miles of canal, 40 feet wide at top, 28 at bottom, 40 feet on water line, 4 feet depth of water. Towing path 6 feet above the bottom, at $6,000 per mile including grubbing,					1,428,000
					2,769,000
Add ten per cent. for incidentals,					276,900
					$3,045,900

Estimate No. 2.

Northern route, 353 miles 11 perches to Pittsburg, from the mouth of the Juniata.

	RISE.	LOCKS.	CULVERTS.	AQUEDUCTS.	*Dollars.*
From the mouth of the Juniata to Northumberland,	85.48	11	20	5	
Up the West Branch to the Sinnemahoning,	276.85	34	44	8	
To the tunnel at the head of West creek,	896.04	113	16	3	
Tunnel, 482 perches in length 140 feet below surface,					180,000
Five dams and feeder at the head waters of Toby and Elk creeks,					32,000
From the tunnel to the mouth of Clarion river	708.37	89	14	5	
From the mouth of Clarion river down the Allegheny to Pittsburg,	116.46	14	36	8	
	2083.20			31	124,000
			130		195,000
		260			1,300,000
350 miles of canal, at $6000 per mile, including grubbing,					2,100,000
					$ 3,931,000
Add 10 per cent. for incidental expenses,					393,100
					$ 4,324,100

Estimate No. 3.

West Branch Route, 365 miles 289 perches to Pittsburg, from the mouth of the Juniata.

	RISE.	LOCKS.	CULVERTS.	AQUEDUCTS.	
From the mouth of the Juniata to Sinnemahoning,	345.98	43	64	13	
Up the West Branch to the mouth of Clearfield creek,	386.11	49	16	2	
From the mouth of Clearfield creek to the Cherry Tree,	283.15	35	16	1	
					Dollars.
Rail road portage of 14 miles, from the Cherry Tree to the forks of Two Lick creek, - -	-	-	-	- -	112,000
Down Two Lick to Black Lick, and thence to Newport,	260.74	33	16		
From Newport to the mouth of Kiskeminitas,	274.50	34	10	2	
From the mouth of Kiskeminitas to Pittsburg,	46.46	6	11	2	
	1596.94			20	80,000
			133		199,000
		200			1,000,000
351 miles of canal, at $ 6000 per mile, including grubbing,			- -	-	2,106,700
					$ 3,497,000
			Add 10 per cent. for incidental expenses,		349,700
					$ 3,846,700

Estimate No. 4.

Clearfield Creek Route, 394 miles 218 perches, from the mouth of Juniata

	RISE.	LOCKS.	CULVERTS.	AQUEDUCTS.	
From the mouth of Juniata to the mouth of Clearfield creek,	732.09	92	80	15	*Dollars.*
From the west branch up Clearfield creek to tunnel,	725	91	16	1	
Tunnel 367 perches in length,					135,00
Down to Croyle's mill,	202.52	25	5		
From Croyle's mill to the forks	121.48	15	2		
From the forks to Newport, on the Kiskeminitas,	578.50	47	10		
From Newport to mouth of Kiskeminitas,	274.50	34	10	2	
From mouth of Kiskeminitas to Pittsburg,	46.46	6	10	2	
Feet,	2480.55				
				20	80,000
			133		199,000
		310			1,550,000
393 miles of canal, at $6,000 per mile, including grubbing,					2,358,000
					4,322,000
Add 10 per cent. for incidentals,					432,200
					$4,754,200